the confidence which King's organising powers inspired.

The cinchona department was just passing beyond the experimental stage when King was given control. Natural causes render the cultivation of cinchona in northern India unprofitable to private enterprise. Notwithstanding this fact, King so administered the Government plantations and factory that the Government was able, without incurring pecuniary loss, to place the remedies against malaria which cinchona bark yields within the reach of the poorest peasant in India.

The extent and gravity of King's administrative duties did not prevent him from prosecuting the botanical studies which made him one of the leading systematic botanists of the last quarter of the nineteenth century; but with rare self-denial he forbore the publication of his results until the tasks of restoring the gardens and organising the plantations and factory under his charge had progressed so far as to justify his giving the time that was needed to the preparation of ordered statements. But the fact that his scientific attainments were on a level with his administrative powers could not remain concealed from those with whom he corresponded on botanical subjects, and in 1884 he was promoted to the degree of LL.D. by his own university, while in 1887 he was elected into the Royal Society.

In the last-mentioned year the enlightened policy of the Government of Bengal enabled King to found the "Annals" of the Calcutta gardens, a series of sumptuous volumes in which he proceeded to enrich systematic study by providing monographs of difficult and important genera like Ficus, Quercus, Castanopsis, Artocarpus, Myristica, and families like Magnoliaceæ, Anonaceæ, and Orchidaceæ. These contributions to natural knowledge are characterised by the accuracy, lucidity, and completeness which marked everything he did. But as regards the branch of botany of which he thus became so distinguished an exponent, King was influenced by the sense of duty that had so long delayed the publication of his results. His personal predilections were towards problems other than systematic, and, as might be expected in one who had been a favourite pupil of the late Prof. Dickie, F.R.S., these were problems associated with cryptogamic studies. But King's practical mind realised that, important and enticing as such studies are, the path of duty for him led elsewhere. The greatest immediate service he could render to the official and commercial interests of India lay in the provision of recognisable descriptions of hitherto unknown or imperfectly understood phanerogamic plants of economic importance, and especially, as his experience as a forest official had taught him, recognisable descriptions of trees, too frequently neglected by workers whose study of herbaceous plants and shrubs may leave nothing to be desired. To this task King devoted himself in the most single-minded fashion, and in furthering it he commenced in 1889 the publication of the results of a sustained floristic study of the vegetation of the Malayan peninsula, issued from time to time in fascicles that were professedly intended to serve as precursors to a flora of that region, but are so admirably executed that they serve as an efficient substitute for such a work. In 1891, when the various botanical officers in India were linked together in one department, King became the first director of the Botanical Survey of India.

During his Indian career King was able to render much additional service to the country and its Government. He was long a trusted member of the Senate, and served for a term on the syndicate of the University of Calcutta. He was a member of the board of visitors of the Bengal Engineering College, an institution in which he took a warm and effective interest. He was an original member of the committee of management of the Zoological Gardens at Calcutta, the site of which he found occupied by a collection of hovels, and converted into a singularly attractive place of public resort. He was for many years a trustee of the Indian Museum, and for a time was chairman of the trust. He was president of the central committee appointed by Government to investigate the indigenous drugs of India, from its inception in 1894 until his retirement in 1898 after thirty-three years of devoted service to the people and the Government of India.

After his retirement King gave all his energies to the continuation of his "Materials for a Flora of the Malayan Peninsula." But his health, severely tried by his long residence in the East, became gradually more and more impaired, and he realised that he might never see the completion of the work he had allotted himself. His friend Mr. H. N. Ridley, F.R.S., director of the Botanic Gardens, Singapore, stepped into the breach and undertook the elaboration of the monocotyledonous families while King was engaged on the remainder of the dicotyledonous ones, and after 1902, when the thirteenth fasciculus, completing the Calycifloræ, was issued, another friend, Mr. J. S. Gamble, F.R.S., became associated with him in working out the Corollifloræ. Increasing infirmity gradually led to King taking less and less of an active share in the work, and the later families have been elaborated by Mr. Gamble alone.

King's skill as a landscape gardener led to the award of its Victoria medal by the Royal Horticultural Society. His services to humanity in connection with the manufacture and distribution of the alkaloids of cinchona bark were recognised by honorary membership of the Pharmaceutical Society, by the grade of "Officier d'Instruction publique," and by the gift of a ring of honour by H.I.M. Alexander III. of Russia. His invaluable contributions to natural knowledge brought him honorary association with a number of learned societies, and the award of medals by the University of Upsala and the Linnean Society of London, while his administrative qualities were recognised, on the eve of his retirement, by the Government of India.

King was keenly interested in art, in literature, and in many branches of science other than that in the promotion of which he took so active a part. With wide and accurate knowledge he combined a kindly sense of humour and a magnetic charm of manner which rendered intercourse with him a privilege never to be forgotten, and to his many friends his death leaves a blank that cannot be filled.

NOTES.

At the meeting of the Royal Society on Thursday, February 18, telegrams of congratulation on the hundredth anniversary of the birth of Charles Darwin were read from the University of Christiania, the University, Kharkoff, the Naturalists' Students' Association, Kharkoff, the Society of Naturalists, Kharkoff, the council of lecturers, Moscow Women's University, and the Swedish Academy of Sciences, Stockholm. The president reported that telegraphic acknowledgments and thanks had been transmitted to the senders on behalf of the Royal Society.

M. H. Poincaré has been elected president of the French Bureau des Longitudes; M. Bigourdan becomes vice-president, and M. Deslandres secretary.

PROF. W. M. DAVIS was elected president of the Association of American Geographers at the recent annual meeting held in affiliation with the American Association for the Advancement of Science.

THE death is announced of Prof. Victor Egger, professor of philosophy and psychology at the Sorbonne, and distinguished chiefly by his work in psychology. We also notice with regret the announcement of the death of Prof. Carroll D. Wright, professor of statistics and social economics at Clark University, Worcester, Mass., and distinguished among American statisticians and economists.

WE notice with regret the announcement that Dr. D. J. Hamilton, formerly professor of pathology at Aberdeen University, died on February 19 at sixty years of age. Prof. Hamilton was for several years demonstrator of pathology at Edinburgh University, and was appointed in 1882 to the chair of pathology at Aberdeen University, which he resigned last year owing to ill-health.

A CORRESPONDENT writes asking for information concerning "arboreal tumours" which are to be observed attacking trees in certain damp, low-lying districts, and eventually leading to the destruction of the trees. A reference to Kew enables us to state that the subject is dealt with in the late Prof. H. Marshall Ward's "Diseases of Plants," published in the Nature Series of Messrs. Macmillan and Co., Ltd. The matter is lucidly discussed in chapter xxiv. of this work at pp. 222 *et seq.*

WE learn from the *Times* that a fresh attempt is being made to introduce the salmon into New Zealand. Similar attempts have been made previously on more than one occasion, but without success, which is the more remarkable as the acclimatisation of the trout was effected many years ago with the most satisfactory results, many of the New Zealand rivers being now well stocked, and the fish growing to a very large size. The difficulty seems to consist, not so much in getting the eggs to New Zealand in a healthy condition, as in preserving the young fish after hatching. About a million ova have lately been dispatched from London under the direction of Mr. Luke Ayson, the Chief Inspector of Fisheries of New Zealand, and it is hoped that success will attend the new venture.

THE anniversary meeting of the Geological Society of London was held on Friday, February 19, when the officers for the ensuing year were elected as follows:—*President,* Prof. W. J. Sollas, F.R.S.; *vice-presidents,* Mr. G. W. Lamplugh, F.R.S., Mr. H. W. Monckton, Dr. J. J. H. Teall, F.R.S., and Prof. W. W. Watts, F.R.S.; *secretaries,* Prof. E. J. Garwood and Dr. A. Smith Woodward, F.R.S.; *foreign secretary,* Sir Archibald Geikie, K.C.B., Pres.R.S.; *treasurer,* Dr. Aubrey Strahan, F.R.S. The medals and funds awarded, as announced in NATURE of January 21 (p. 347), were then presented. The president delivered his anniversary address, which dealt with time, considered in its relation to geological events, and to the development of the organic world.

BY the will of the late Dr. Francis Elgar, F.R.S., the sum of 1600*l.* is left to the Institution of Naval Architects for the endowment of a scholarship to be awarded as the council may decide, but the hope is expressed that the scholarship will be similar to that given by him during his life. After making other bequests, one-half of the residue (which will apparently amount to between 32,000*l.* and 34,000*l.*) is eventually to be divided equally between the Institution of Naval Architects for the encouragement of the science and art of naval architecture, and the University of Glasgow, to be held upon trust for the furtherance of the objects of the John Elder chair of naval architecture in that University.

AT the annual general meeting of the Physical Society on January 12 the following officers and council were elected for the ensuing year:—*President,* Dr. C. Chree, F.R.S.; *vic-presidents,* those who have filled the office of president, together with Mr. W. Duddell, F.R.S., Prof. A. Schuster, F.R.S., Mr. S. Skinner, and Dr. W. Watson, F.R.S.; *secretaries,* Mr. W. R. Cooper and Dr. S. W. J. Smith; *foreign secretary,* Prof. S. P. Thompson, F.R.S.; *treasurer,* Prof. H. L. Callendar, F.R.S.; *librarian,* Dr. W. Watson, F.R.S.; *other members of council,* Mr. A. Campbell, Dr. W. H. Eccles, Dr. A. Griffiths, Dr. J. A. Harker, Prof. C. H. Lees, F.R.S., Mr. T. Mather, F.R.S., Dr. A. Russell, Prof. E. Rutherford, F.R.S., Mr. F. E. Smith, and Mr. R. S. Whipple.

THE Washington correspondent of the *Times* announces that the State Department is preparing invitations, which will be sent out as soon as possible, for an international world conference at The Hague next September to consider the conservation of natural resources. In making this announcement, President Roosevelt said that, even though no great and important immediate results were derived from the conference in the direction of conservation, he hoped that all nations would be represented. The first immediate result of the conference is expected to be a general inventory of the natural resources of the world. An effort will be made to ascertain how the world stands regarding such resources, with discussion on what has been done by different nations towards conservation, what is best to do, and what may be reasonably expected.

MATERIAL for a series of illustrated lectures on the results which have been obtained by recent discoveries in the prevention or treatment of disease has been prepared by the Research Defence Society. A number of lantern-slides illustrative of progress and discovery in respect of malaria, yellow fever, sleeping sickness, Malta fever, diphtheria, &c., have been made, and the slides are accompanied by full descriptive catalogues, with notes and references, and a print of each slide, for the use of lecturers. The society is willing to lend these materials for lectures to accredited persons who are in sympathy with the excellent object of disseminating sound and trustworthy information on the aims and achievements of research in medicine and physiology. In certain cases the society is prepared to send a lecturer, and at all times will lend every assistance to ensure the success of a lecture to a good audience. Communications and inquiries on this subject should be addressed to Mr. Stephen Paget, hon. sec., 70 Harley Street, W.

AN interesting gathering of the Leeds Naturalists' Club was held on February 15 to celebrate the Darwin centenary. Mr. Harold Wager, F.R.S., delivered an address on Charles Darwin, in which he reviewed the life of the great naturalist, the unselfishness of both Darwin and Wallace in respect of their simultaneous discovery, the development of the hypotheses by Darwin himself and by Haeckel, Weismann, and Mendel. There was an interesting exhibit by the president of the club (Mr. W. Denison Roebuck) in the form of a lithographic facsimile of the illuminated address which a deputation, representing the naturalists of Yorkshire, headed by the late Prof. W. C. Williamson, F.R.S., presented to Darwin in November, 1880, in celebration of the coming of age of the "Origin of Species," and the autograph letter in which Darwin acknowledged the compliment. Subsequently a resolution was adopted congratulating Dr. Alfred Russel Wallace, O.M., on the completion last year of fifty years from the simultaneous publication by the Linnean Society of the papers by Darwin and himself, in which the influence of variation and natural selection in the development of species was described.

IN NATURE of January 28 reference was made to the earthquake which was recorded by seismographs in India, Europe, and South Africa on January 23. Its origin was provisionally placed in western central Asia, but now proves to have been further south, in the Luristan district of Persia, about two days' journey from Burujird, where fifty villages are said to have suffered and 5000 lives to have been lost. This earthquake illustrates the difficulty which sometimes arises in fixing an origin from distant records; the European and Indian records gave a locus in the form of a band running about north-north-eastwards through the country east of the Caspian Sea, but did not permit of fixing it more closely. The Cape of Good Hope record should have supplied the data for doing this, as the observatory lies almost on the continuation of this locus, but that the earthquake, being no greater than that of Messina, the first tremors failed to impress themselves on the seismograph; this loss of the commencement of the disturbance made it impossible to determine the exact situation of the origin, and suggested that it was not, as has actually proved to be the case, at the nearest end of the strip of country indicated by the Indian and European records.

THE *Nineteenth Century* for February contains a paper by Dr. C. Davison on the Messina earthquake, illustrated by two sketch-maps, one showing the principal isoseismal lines of the earthquake, the other the seismic zones of southern Calabria, as delineated by Dr. M. Baratta. The places that were partly or entirely destroyed lie within three nearly circular curves, the most important including Messina, Reggio, and Pellaro, and having its centre beneath the Straits of Messina, the others in the neighbourhoods of Palmi and Monteleone respectively. The total area of these curves is estimated at about 500 square miles, and the disturbed area, including the portion covered by the sea, at about 150,000 square miles. The recent earthquake, like those of 1783 and 1905, was thus polycentric. In 1905, as in 1908, the different centres (namely, those near Palmi, Monteleone, Nicastro, Cosenza, and Bisignano) were in action simultaneously, or nearly so. In 1783 they came into action successively, the first great shock taking place in the Palmi zone, the second in that of Scylla, the third in the Monteleone zone, the fourth, as recently, in the Messina zone, the fifth in the Monteleone zone, and the sixth in the Girifalco zone. In other earthquakes single centres appear to have been in action, the Palmi zone in 1894, the Monteleone zone in 1659, the Nicastro zone in 1638, the Cosenza zone in 1854, and the Bisignano zone in 1836. Thus there appear to be several more or less detached centres of maximum disturbance, though their simultaneous activity in 1905 and 1908 indicates that there must be some deep-seated connection between them.

SEVERAL reports of scientific interest were referred to in the report of the council of the Institution of Mechanical Engineers, presented at the annual general meeting on Friday, February 19. Since October, 1907, an investigation for the Alloys Research Committee has been in progress in the metallurgical department of the National Physical Laboratory on the ternary alloys of copper-aluminium, and a report dealing with copper-aluminium-manganese is expected shortly. The results of the prolonged sea-water corrosion tests, which have been carried on at Portsmouth Dockyard on the specimens of copper-aluminium alloys, referred to in the eighth report, will be published with the next report of the committee. The research in connection with gas-tightness and steam-tightness of metal castings is being continued at the University of Manchester. The three new subjects selected for investigation in accordance with the vote of the members, referred to in the last annual report, have received attention during the year. A comprehensive report upon the transfer of heat across metallic surfaces in contact with water and with gases will shortly be brought before the institution for reading and discussion. Reports are also being prepared upon the features of refrigerating machinery in which further investigation is needed, and the action of steam passing through nozzles and steam turbines.

WE have received a newspaper cutting containing the report of the Port Elizabeth Museum for 1908, from which we learn that great efforts are being made by the president to develop that institution, especially from the point of view of local education. These endeavours are, however, considerably hampered by lack of sufficient financial resources. Several important additions were made to the collections during the year. The number of visitors who passed the turnstiles was considerably less than in 1907.

IN the February number of *Naturen* Dr. L. Stejneger adduces further evidence in favour of the theory of the existence, at a comparatively recent date, of a land-bridge between Scotland and Scandinavia. This evidence is mainly based on the distribution of the species, or races, of charr (Salvelinus), which is illustrated by a map. *Salvelinus alpinus* is considered to be common to western Scandinavia and Scotland, while in eastern Scandinavia we have the typical *S. salvelinus* of the Alps. Iceland is the home of *S. nivalis*, while further north occur *S. insularis* and *S. stagnalis*. Lapland is the home of an intermediate form known as *S. salvelino-stagnalis*, while another annectant type, *S. alpino-stagnalis*, occurs in Greenland.

HAVING completed the investigation of the degenerate eyes of the Australian marsupial mole (Notoryctes), Miss G. Sweet has directed her attention to those of the African golden moles (Chrysochloris), the results of this later study being published in vol. liii., part ii., of the *Quarterly Journal of Microscopical Science*. In the Chrysochloridæ the eye has sunk only into the dermis, where it is surrounded by the hair-roots; but the eye-muscles have disappeared, as has the vitreous humour, while the lens and iris are very degenerate. The optic nerve is retained in some instances and lost in others. Despite its comparatively superficial position, the eye is not visible externally; the loss of the eye-muscles is an unusual feature. That the eye, even were the cleft at the proper angle for admitting light-rays, is quite useless for vision is certain, and it is improbable that it is capable of detecting even degrees of light.

GREAT interest attaches to a paper by Mr. G. R. Wieland in the February number of the *American Journal of Science* on the structure of the Cretaceous marine turtles of the Protostegidæ, since the facts therein adduced go a long way, at any rate in the author's opinion, to solve the problem of the relationship of the leathery turtle (Dermochelys) to ordinary turtles (Chelone). These turtles, as represented by Protostega and Archelon, attained gigantic dimensions, and, in accordance with the needs of a pelagic existence, lightened the carapace by a great reduction in the size of the costal plates, which are more aborted in the type-genus than in the modern Chelone, thus leaving very large intercostal vacuities. The reduction is carried to a still greater degree in Archelon, the absorption process being also extended to the neural bones, many of which, so far as can be seen, appear to be reduced to thin films. Upon the neurals in this genus are, however, superimposed a series of digitate epineural dermal bones, which correspond to the neural keel of Dermochelys, and discharge the function of the aborted neurals. It is added that in life Archelon must have possessed a leathery hide, with a system of keels similar to those of the leathery turtle. In conclusion, the author observes "that of the two camps which have attacked the difficult and highly attractive problem of the origin of Dermochelys, those favouring the view of a close relationship to ordinary turtles and a comparatively recent origin have rather the best of the argument." It seems, in fact, that Dermochelys and its allies, having become less pelagic in habits than ordinary turtles, found the reduction in the bony framework of their carapace a disadvantage, and they accordingly developed a secondary structure of overlying dermal bones to take the place of the proper carapace, which then underwent a still further reduction, and finally vanished.

THE January number of the *Psychological Review* (Baltimore) contains a further contribution to the study of galvanometric deflections which they ascribe to psychological processes in man. This branch of work, which was started by Dr. Petersen, has led the authors to the conclusion that active emotional processes in man bring about electromotive forces, and consequent galvanometric deflections. These results have been the subject of somewhat sensational articles in the lay Press, but it is wise at present to withhold judgment on their interpretation. Voluntary muscular movements, secretion of the glands in the skin and other parts, the cardiac activity, and the action of other internal organs are all accompanied with electrical changes, and although the authors claim to have eliminated currents due to these causes, we do not think that physiologists accustomed to the study of electrophysiology by the use of the galvanometer or electrometer will be convinced that such is the case. The very erratic galvanometric movements described are just what we would anticipate in the bewildering intermixture of physiological activities which the intact human body presents. To conclude that they are produced in the anatomical correlate of various psychical phenomena is, to say the least of it, extremely premature.

FOLLOWING upon a study of the genus Pentstemon in the Western States, Dr. L. Krautter has compiled a list, with diagnoses, of American species, that is published as vol. iii., No. 2, of the Contributions from the Botanical Laboratory of the University of Pennsylvania. The arrangement of the sections as drawn up by Asa Gray has been followed, but whereas Gray's last contribution recognised eighty species, the present collation includes nearly a hundred and fifty species.

WHILE afforestation is providing a topic of general discussion, it is opportune to refer to the Chopwell Woods, an area of 930 acres near Newcastle, that was made over by the Commissioners of Woods in 1904 to Armstrong College. The working plan, by Mr. J. F. Annand, is briefly noted in the Transactions of the Royal Scottish Arboricultural Society (vol. xxii., part i.). The soil varies from stiff clay through loams to sand and pebbly gravels; the old plantations, chiefly of oak, larch, or Scots pine, are none of them productive. It is proposed now to grow various coniferous trees. Larch will be planted on the best-drained loamy soil, Scots pine on the poorest, and spruce will be tried on moist soil. Corsican pine, Sitka spruce, and Douglas fir will also receive a trial.

A BOOK on trees and shrubs, native or introduced, to be published in sixteen parts, at the price of one shilling the part, is announced by Messrs. J. M. Dent and Co. The main object of the book is to provide descriptions for identifications of the plants, while short details regarding cultivation and origin have been given. Beginning with the Ranunculaceæ, the genera Clematis, Magnolia, and Calycanthus are treated in the first part. The authors, Messrs. C. S. Cooper and W. P. Westell, have perforce limited the species of Clematis to three, but ten of the Magnolias are described. The general plan is well conceived, and the text bears evidence of careful compilation, but a striking omission occurs in the absence of the names of the authorities for the specific binomials. The black-and-white artistic drawings by Mr. C. F. Newall are chiefly intended for diagnostic purposes, and sixteen coloured illustrations will serve to delineate general habit.

COLONEL PEASE, Inspector-General of the Indian Civil Veterinary Department, in the October (1908) number of the *Agricultural Journal of India*, records a discovery of much importance to poultry fanciers in the East. No more fatal disease than that hitherto known as "fowl cholera" is found in India. Quite accidentally, Conductor Dare at Mian Mir, while studying the surra disease in camels, ascertained by the use of the microscope that the death of some ducks from "cholera" was really due to a specific organism of the Spirochætes type. It is spread by the agency of the *Argas persicus*, or common fowl-tick, which it is difficult to destroy. The best method of dealing with it is to burn the old roosts and nests; but scraping the walls of the fowl-houses, painting them with hot coal tar, and brushing the feathers of the birds with paraffin have been found efficacious. Now that the disease has been traced to this parasite, a suitable form of treatment will doubtless soon be discovered.

THE Weather Bureau of the Philippine Islands has issued an advance chart showing the approximate tracks of four typhoons that crossed the archipelago from September 23 to October 13, 1908. The first and fourth of these were remarkable for the terrific violence of the winds; the latter, also, for the great floods which swept the Cagayan Valley during the passage of the cyclonic centre. These typhoons will be discussed, in due course, in the bulletins for the respective months; the last number received is for February, 1908, and contains a catalogue of Philippine earthquakes for February, 1890–1907. The Manila Observatory, like those of Hong Kong and Zikawei, has published a typhoon-warning code; it is intended principally to lighten the burden generously borne by several telegraphic companies by the free transmission of reports between the chief meteorological services in the Far East.

To the Proceedings of the Rhodesia Scientific Association, vol. vii., part ii., Messrs. F. White and E. C. Chubb contribute a paper on a cave containing fossilised bones, worked pieces of bone, stone-implements, and quartzite pebbles. The cave is situated in a small hill of zinc and lead ores in north-western Rhodesia, and an account of its contents was given in the *Geological Magazine* for October, 1907. With the exception of a humerus and tibia of a rhinoceros, all the mammalian bones specifically identified are referred to existing forms. The rhinoceros bones are, however, considered to indicate an animal of slighter build than either of the living species, and are therefore regarded as belonging to an extinct form, for which the name *Diceros whitei* is suggested.

The Austrian Meteorological Office has issued, as part ii. of the "Climatology of Austria," a discussion of the observations at Trieste for the sixty years 1841–1900, by Mr. E. Mazelle, director of the maritime observatory at that place. In addition to its importance as a contribution to climatology, the discussion of this long series is intended to serve as a basis for the "reduction" of mean values in neighbouring localities for shorter periods to one of similar length. The tables contain, *inter alia,* mean and extreme values for yearly, five-yearly, and ten-yearly periods. The mean annual temperature of Trieste for the sixty years was 57°·4; July, 75°·6; January, 40°·1. The absolute maximum for thirty-two years (1869–1900) was 99°·5 (July, 1873); the minimum, 14°·0 (February, 1870); but in January, 1907, a reading of 9°·0 was recorded. The annual rainfall is approximately 43 inches; the wettest month is October, and the driest February; rain falls on an average on 109 days in the year.

The past week was exceptionally fine and dry over the whole of Great Britain, and the weather was practically rainless in all parts of England. The aggregate measurement of rain for February is likely to prove very much below the average over the entire area of the British Isles. At Greenwich the rainfall to February 24 was 0·32 inch. In February, 1891, the total measurement of rain at Greenwich was 0·04 inch, so that the present month is far from establishing a record in this respect. The duration of bright sunshine was everywhere large, and in England the weather was exceptionally brilliant. For the five days from February 18–22 inclusive, the sun shone for forty-two hours at Greenwich, where the average duration for the month is fifty-seven hours. Sharp frosts have occurred at night over England. At Greenwich the exposed thermometer on the grass fell below 20° on each night during the last week, and on three nights it fell to 11°. Frost also occurred each night in the shade, and on the morning of Tuesday, February 23, the thermometer in the screen fell to 19°, which is lower than any reading so late in February during the last sixty years. The day temperatures have been fairly high for the time of year, due to the bright weather, and on the four consecutive days from February 19–22 the thermometer in the sun's rays exceeded 90°, and on Monday, February 22, it rose to 97°. The fine and dry spell of weather over England was due to the prevalence of anticyclonic conditions, a region of high barometer readings being situated over the United Kingdom.

Natural science and the healing art formed the subject of Prof. Tschirch's rectorial address at the anniversary festival in the University of Bern in November last ("Naturforschung und Heilkunde," by Prof. A. Tschirch. Pp. 30. Leipzig: C. H. Tauchnitz, 1909. Price 1 mark). This ancient seat of learning can boast many great names in the past, and the new rector was able to point to Haller, among others, who recognised the importance of natural science in the progress of medicine. Growth in the knowledge of science has been accompanied by an increase in the means the physician and surgeon possess in grappling with disease. Chemistry is no longer a mere handmaid of medicine, though biochemistry may be regarded as one of the most important factors in the future progress of medicine. The subject is throughout treated in a philosophical manner, and the address will well bear careful perusal.

According to a note in the January number of the Journal of the Franklin Institute, the Forest Service at Washington is watching with interest the substitution of cement for wood as a building material. While the demand for timber has remained almost stationary, the production of cement has increased in the last five years from 25 to 50 million barrels.

Le Radium for January contains a table of radio-active constants compiled by eleven well-known workers in the field of radio-activity. The constants tabulated for each substance are:—the atomic weight, the time constant, the half-decay time, the mean life, the nature of the radiation, the mean path in air of the emitted α rays, the thickness of aluminium which will stop those rays, and the thickness necessary to reduce the β and γ rays to half intensity. The table will be very useful, not only as a record of what is already known, but as an indication of the lacunæ which remain to be filled.

The report of the International Committee on Atomic Weights for 1909 contains a discussion of researches dealing with the atomic weights of hydrogen, chlorine, sulphur, lead, cadmium, tellurium, rhodium, palladium, europium, erbium, ytterbium, columbium, and radium. The changes proposed are:—chlorine, from 35·45 to 35·46; sulphur, 32·06 to 32·07; lead, from 206·9 to 207·1; tellurium, 127·6 to 127·5; palladium, from 106·5 to 106·7; columbium, from 94 to 93·5; radium, from 225 to 226·4. A general revision of the whole table of atomic weights has been made on the basis of the following fundamental data:—when O=16, H=1·008, C=12·000, N=14·007, Cl=35·460, Br=79·916, Ag=107·880, K=39·095, S=32·070. The changes introduced by this re-calculation are small and comparatively unimportant.

Since the time of Prout, the calculation of the atomic weights of the elements by means of a formula has been a favourite speculation. Some of the earlier attempts were considered satisfactory by their proposers if the calculated and experimental values agreed within a unit or two, and were, moreover, usually based on an empirical formula. Two recent attempts in this direction (A. L. Bernouilli, "An Atomic-weight Formula on the Basis of the Law of Mass Action and Avogadro's Law," *Zeitschrift für physikalische Chemie,* January 26, and A. C. G. Egerton, "The Divergence of the Atomic Weights of the Lighter Elements from Whole Numbers," read before the Chemical Society on February 4) fall in a different category. The formulæ are proposed on a definite physical basis, and the values for the atomic weights deduced are very close to the best experimental numbers.

The elastic breakdown of materials submitted to compound stresses forms the subject of articles in *Engineering* of February 5 and 12, contributed by Mr. L. B. Turner. The author discusses the various theories and investigations which have been advanced for ductile materials, the three principal being Rankine's, based on breakdown taking place when a certain maximum tension occurs; Euler's, based on a certain maximum stretch being obtained; and Guest's, based on occurrence of a certain maximum shearing stress. Of these, the first two will not bear the test of experimental investigation; the latter was first enunciated by Guest in the *Philosophical Magazine,* 1900, and was supported by a large number of his experimental results. Mr. Turner has repeated some of Guest's experiments, using weldless steel tubes, which were all annealed under similar conditions in an electric furnace. Nineteen results for combined pull and torque are given, of which two may be disregarded as being abnormal. The remaining seventeen results show a mean difference of 485 lb. per square inch in the maximum shearing stress at breakdown, giving a discrepancy of 3 per cent. only. By calculation from the results of these tests, it is shown that the maximum tension hypothesis is wrong by 50 per cent., and the stretch hypothesis by 35 per cent., taking Poisson's ratio as 0·3. Mr. Turner's experiments may therefore be regarded as giving strong support to Guest's theory. The author proposes to investigate stress of three dimensions, and also to find how far the results obtained for static stress may be applied to the case of stress the magnitude of which is subject to constant variation.

THE twentieth annual issue—that for 1909—of the "Public Schools Year-book and Preparatory Schools Year-book" is now available. Among new features characterising the present volume may be mentioned articles on the universities, giving full details of universities other than Oxford and Cambridge; additional information on qualifying for the Scots Bar and the profession of Writer to the Signet; an article dealing with chemistry as a profession; and a list of lecturers who attend public and preparatory schools. To parents and others selecting either a school or a profession for their boys this enterprising annual should prove invaluable; it is published by Messrs. Swan Sonnenschein and Co., Ltd., and its price is 3*s*. 6*d*. net.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN MARCH :—

March 1. 11h. 32m. Neptune in conjunction with the Moon (Neptune 2° 37′ S.).
4. 12h. 37m. Variable star Algol at minimum.
5. 21h. 50m. Jupiter in conjunction with the Moon (Jupiter 3° 42′ S.)
7. 9h. 26m. Variable star Algol at minimum.
16. 3h. 3m. Mars in conjunction with the Moon (Mars 1° 26′ N.).
,, 14h. 19m. Uranus in conjunction with the Moon (Uranus 2° 4′ N.).
20. 13h. 0m. Venus in conjunction with the Moon (Venus 3° 52′ N.).
21. 23h. 46m. Saturn in conjunction with the Moon (Saturn 2° 41′ N.).
26. 8h. 54m. Mars and Uranus in conjunction (Mars 0° 18′ S.).
27. 11h. 8m. Algol at minimum.
28. 17h. 30m. Neptune in conjunction with the Moon (Neptune 2° 51′ S.).
30. 8h. 40m. Red spot central on disc of Jupiter.

A BRILLIANT METEOR AND ITS TRAIN.—A brilliant meteor was seen over a large part of the south of England about 7.30 on Monday evening, February 22. A luminous cloud or streak was visible for a long time after the meteor itself had disappeared. The Rev. F. J. Jervis-Smith, F.R.S., writing from Battramsley House, near Lymington (long. 1° 32′ W., lat. 50° 48′ N.), says:—"At 7.30 p.m. on February 22 my attention was directed by my gardener to a luminous streak or band left by a meteor, which he had seen about twenty minutes before while cycling near Brockenhurst. The streak was not straight, but slightly curved, first towards the north, then to the south, then again to the north, then, turning through about 110° to its mean path, towards the south, it was lost to sight. The streak passed through ε Ursæ Majoris and γ Cassiopeiæ. The streak was clearly visible up to 8 p.m. The width of the luminous band covered, roughly, one-eighth of the distance between δ and ζ Ursæ Majoris. The gardener described the luminous head of the meteor as being like the head and shoulders of a whale in shape. While I watched the streak a small meteor crossed the heavens, starting near Polaris, the path being south to north."

Miss Annie L. Waud, observing at Farnham, first observed the luminous appearance at 7.50 p.m. "It was then in Eridanus, and was a glowing streak of light, with two short branches or tails; the streak rapidly moved towards the north-west, the tails growing longer, the upper one gradually spreading through Orion, first through Rigel and then through the belt, finally stretching far beyond and above that constellation. The mass grew fainter as it sank at 8.30 p.m. towards the west, but the upper tail, which was now forked, was distinct until 9.30 p.m."

Dr. T. K. Rose saw this luminous train between Orion and the horizon, at Northwood, "from about 7.45 to between 9 and 10 o'clock, when it was lost in mist near the horizon. It was faint, and could not have been seen but for the brilliance of the night." The apparent shape of the luminous mass changed greatly during this interval, but no nucleus was seen by Dr. Rose at any time. With an opera-glass stars could be seen through the cloud.

QUANTITATIVE MEASURES OF THE WATER-VAPOUR IN THE MARTIAN ATMOSPHERE.—From measures of the relative intensities of the *a*, water-vapour, band in the spectra of Mars and the moon recently obtained by Mr. Slipher at the Lowell Observatory, Prof. Very has derived quantitative results showing the probable ratio between the amount of water-vapour in the Martian atmosphere and the amount of water-vapour in the Flagstaff atmosphere at the time the spectrograms were taken.

The measurements were made with a "spectral-band comparator" devised by Prof. Very, the narrower component of the *a* band, λ 7160–7200, being measured in every case; the relative intensity of the C band was also measured, on each set of spectra, as a check.

The readings given by the comparator were found to be very consistent, but were merely conventional. Reducing these measures so that they represent absolute intensities, Prof. Very finds that the *a* band in the spectrum of Mars is about 4·5 times as strong as in the lunar spectrum, and a further reduction brings out the fact that at the time of exposure the Martian atmosphere must have held in suspension about 1·75 times as much water-vapour as existed in the earth's atmosphere above Flagstaff.

Finally, Prof. Very arrives at the conclusion that whilst the atmosphere above Flagstaff contained sufficient precipitable water to give an average layer of about 8 mm. in depth, the average layer of precipitable water on Mars was about 14 mm.; the mean value for the earth would probably be three or four times as great (Lowell Observatory Bulletin, No. 36).

ABSORPTION OF LIGHT IN SPACE.—In a paper appearing in No. 1, vol. xxix., of the *Astrophysical Journal* (p. 46, January), Prof. Kapteyn discusses one or two phenomena which point to the absorption of star-light during its passage through interstellar space.

That the stars appear gradually to thin out as we recede farther and farther from the solar system is *a priori* evidence that some such absorption exists, otherwise we must assign to the sun a unique position in the universe, that is, the place of maximum density.

In a previous discussion Prof. Kapteyn found a provisional value for the absorption amounting to 0·016 of a magnitude for the distance of thirty-three light-years, as an average for the whole of the sky. Recently obtained results of spectral classification, from Harvard, permitted him to make another attack on the problem by investigating the probable average distances of Miss Maury's two classes of stars of which α Boötis and α Cassiopeiæ are typical. The spectra of the former of these two classes exhibit less general absorption than do those of the latter, and from an analysis of the proper motions given in Newcomb's "Fundamental Catalogue" Prof. Kapteyn finds that, *as a rule*, the proper motions in the α Boötis division greatly exceed those in the α Cassiopeiæ division. This is evidence that they are, as a class, nearer to us, and would, therefore, exhibit less general absorption, if it were due to an absorbing medium, than would the α Cassiopeiæ stars. Thus the present investigation strengthens the probability of the existence of such an absorbing medium.

THE ORBIT OF θ AQUILÆ.—From radial-velocity observations made at the Allegheny Observatory during 1907, Mr.